REMARKS

Claims 1-18 are pending after this amendment.

The remarks presented herein are in response to the Office Action dated March 2, 2007.

Response to Rejection Under 35 USC 102(b) in View of Chang et al.

The Examiner rejected claims 1-15 and 17-18 under 35 USC § 102(b) as allegedly being anticipated by Chang et al. (PCT/US97/08266) ("Chang"). This rejection is traversed.

Claim 1 recites:

> A method of detecting at least one of a pan and a zoom in a video sequence, comprising:
>
> selecting a set of frames from a video sequence;
>
> determining a set of motion vectors for each frame in the set of frames;
>
> identifying at least two largest regions in each frame having motion vectors with substantially similar orientation in a reference coordinate system;
>
> determining percentages of each frame covered by the at least two largest regions;
>
> determining a statistical measure of the motion vector orientations in the reference coordinate system for at least one of the two largest regions; and
>
> comparing the percentages and statistical measure to threshold values to identify at least one of a pan and a zoom in the video sequence

The claimed method is a method of detecting a pan or a zoom in a video sequence. A set of frames are selected from a video sequence and a set of motion vectors are determined for each frame in the set of frames. At least two largest regions in each

frame having motion vectors having substantially similar orientation are then identified, and the percentage of each frame covered by the largest regions having similarly oriented motion vectors is determined. A statistical measure of the motion vector orientations for at least one of the identified largest regions is then computed. The computed statistical measure and percentage of each frame covered by the similarly oriented frames are then compared to threshold values to identify a pan or a zoom.

The claimed method thus provides a technique for detecting a pan or a zoom in a video sequence without computing motion where most of the image points are uniformly displaced (i.e., computing global motion). Evaluating motion vector orientation in one of the largest regions, rather than for the entire frame, reduces the computation necessary to detect a pan or a zoom in the frame. This beneficially improves the efficiency of pan or zoom detection.

Chang does not disclose "identifying at least two largest regions in each frame having motion vectors with substantially similar orientation in a reference coordinate system," as recited in claim 1. Chang merely discloses detecting moving objects within a frame by identifying areas of a frame with motion vectors different than the non-moving areas of the frame (see page 17, lines 4-6). This detection merely compares motion vectors to a predetermined threshold value to eliminate areas of the frame where motion vectors are below the predetermined threshold value (see page 17, line 8). However, this detection identifies non-moving regions and moving regions of the frame, which are regions with <u>substantially different</u> motion vector orientations. Further, the detection in Chang merely compares each motion vector to a threshold value to determine the presence of motion, regardless of the direction of the motion. There is no indication that the predetermined threshold disclosed in Chang accounts for the orientation of the motion vectors. Rather, the predetermined threshold determines the presence or absence of motion, in any

orientation. Thus, the detection in Chang will identify two regions with opposing motion vector orientations as long as the motion vectors exceed the predetermined threshold. In contrast, the claimed method identifies at least two regions of a frame having motion vectors with "<u>substantially similar orientations</u>", allowing the two largest regions of the frame to represent motion within the entire frame. Therefore, Chang fails to disclose "identifying at least two largest regions in each frame having motion vectors with substantially similar orientation in a reference coordinate system," as recited in claim 1.

Additionally, while Chang discloses comparing contiguous blocks of non-zero motion vectors to a predetermined minimum threshold value, this comparison merely removes blocks of motion vectors smaller than the predetermined minimum threshold value, and does not identify "at least two largest regions in each frame" (see page 17, lines 9-12). Rather, any contiguous area larger than the predefined threshold value is identified, not at least two largest regions in each frame. This comparison also does not account for the orientation of the motion vectors within a contiguous area, so areas with substantially different motion vector orientations are identified, provided the area size exceeds the predetermined minimum threshold value. Hence, Chang merely identifies all contiguous areas of image data larger than a minimum threshold value and having motion vectors that exceed a threshold value, regardless of the motion vector orientation.

On page 3 of the Office Action, the Examiner states

> However, digital images (frames, pictures, etc.) are conventionally comprised of background and foreground regions wherein backgrounds normally occupy larger regions in the image. Backgrounds are usually contiguous regions having substantially similar pixel values. Consequently, the motion vectors generated for these background regions in reference and target frames will have substantially similar orientation.

However, Chang does not teach or suggest identifying the foreground and background of a frame. While Chang discloses parsing video information into NxN blocks which are

then analyzed, there is no disclosure in Chang of identifying the foreground and background of the video data (see page 12, lines 4-13). The NxN blocks in Chang are analyzed to detect moving and non-moving objects in the blocks, without determining whether the blocks comprise image foreground or background. Furthermore, claim 1 recites "identifying at least two largest regions in each frame having motion vectors with substantially similar orientation," so for <u>each</u> frame <u>at least two</u> largest regions with substantially similarly oriented motion vectors are identified. However, the Examiner's statement mischaracterizes the technique disclosed in Chang. Although images may include background and foreground regions, Chang merely identfies regions having a certain size with motion vectors exceeding a threshold value, regardless of whether these regions are in the background or foreground of the frame.

Additionally, even if the background of a "reference frame" and the background of a "target frame" have substantially similar "pixel values," as stated by the Examiner, claim 1 recites determining the two largest regions in <u>each frame</u> having motion vectors with substantially similar orientation. So, claim 1 identifies at least two largest regions of <u>a frame</u> having substantially similarly oriented motion vectors, and does not identify regions of different frames with similarly oriented motion vectors. In contrast, the Examiner's statement requires examination of different frames, a "reference frame" and a "target frame," to identify regions with substantially similar motion vector orientation. The use of different frames in Examiner's statement is fundamentally different from claim 1, which identifies "at least two largest regions <u>in each frame</u> having motion vectors with substantially similar orientation."

Accordingly, claim 1 is patentable over Chang.

Claims 7 and 13 similarly recite "identifying at least two largest regions in each frame having motion vectors with substantially similar orientation in a reference coordi-

nate system." Thus, all arguments advance above with respect to claim 1 also apply to claims 7 and 13, and the rejection of those claims should be withdrawn.

As claims 2-6 are dependent on claim 1, all arguments advanced above with respect to claim 1 are hereby incorporated so as to apply to claims 2-6. As claims 8-12 are dependent on claim 7, all arguments advance above also apply to claims 8-12. As claims 13-15 and 17-18 depend from claim 12, all arguments advanced above also apply to claims 13-15 and 17-18.

Response to Rejection Under 35 USC 103(a) in View of Chang et al.

In the 4th paragraph of the Office Action, Examiner rejects claim 16 under 35 USC § 103(a) as allegedly being unpatentable over Chang et al. (PCT/US97/08266) ("Chang"). This rejection is respectfully traversed.

As claim 16 is dependent on claim 12, all arguments advanced above are also applicable to claim 16. In addition, the Official Notice relied upon by the Examiner does not overcome the deficiencies of Chang. The Official Notice merely indicates that polar coordinates are a form of mathematical representation. The Official Notice does not disclose "identifying at least two largest regions in each frame having motion vectors with substantially similar orientation in a reference coordinate system." Thus, the combination of Chang and Official Notice fails to disclose the subject matter of claim 16.

Therefore, claim 16 is patentably distinct over the cited references, both alone and in combination. Therefore, Applicants respectfully request that Examiner reconsider the rejection and withdraw it

On the basis of the above Remarks, consideration of this application and the early allowance of all claims herein are requested.

Should the Examiner wish to discuss the above amendments and remarks, or if the Examiner believes that for any reason direct contact with Applicants' representative would help to advance the prosecution of this case to finality, the Examiner is invited to telephone the undersigned at the number given below.

Respectfully submitted,
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